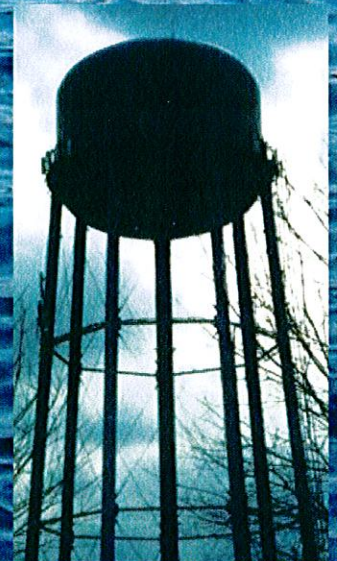
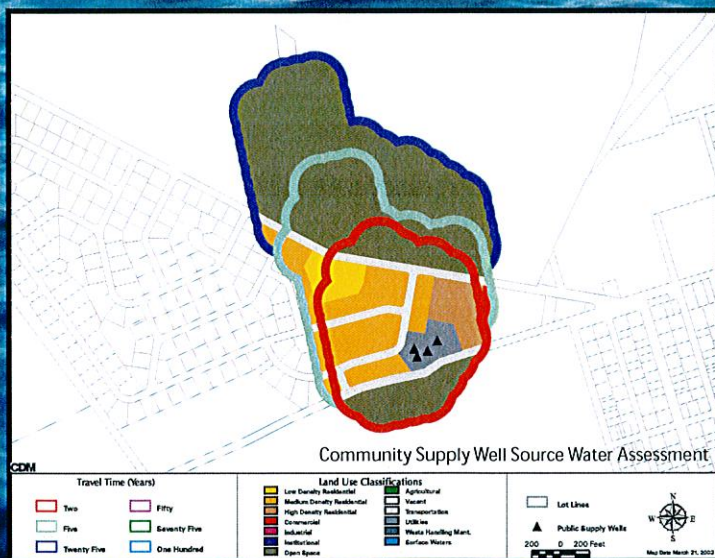
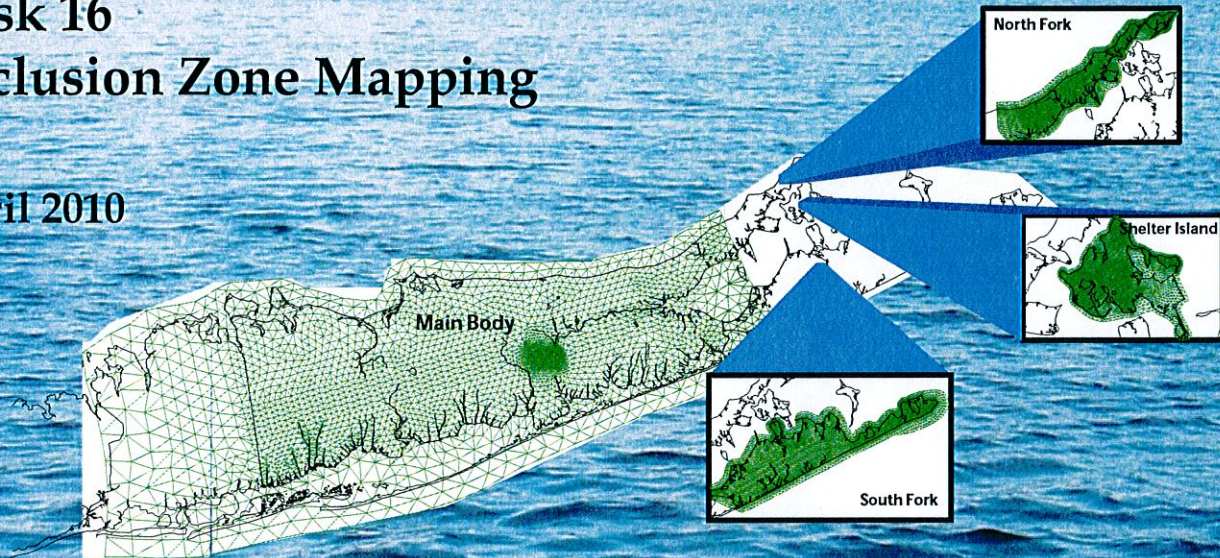


Comprehensive Water Resources Management Plan for Suffolk County

Task 16 Exclusion Zone Mapping

April 2010



Memorandum

To: Martin Trent

From: CDM

Date: April 1, 2010

*Subject: Suffolk County Comprehensive Water Resources Management Plan
Task 16 – Exclusion Zone Mapping*

1.0 Introduction

Existing water quality protection programs limit development density in the County's deep recharge zones to manage the amount of contamination introduced to the aquifer system from overlying land use. The Suffolk County Department of Health Services (SCDHS) also refers to mappings of the land surface area contributing recharge to public supply wells when reviewing development plans, to discourage siting of facilities or developments with the potential to discharge contamination that could impact a public supply well. Unsewered areas that contribute groundwater baseflow to significant surface water resources such as the Long Island Sound, Peconic Estuary and South Shore Estuary Reserve also have the potential to affect surface water quality.

The purpose of this task was to develop a mapping of all of the areas in Suffolk County that warrant protection, strictly from a water resource management standpoint, based upon the criteria developed by the SCDHS to protect drinking water, groundwater recharge and surface waters. The approach considered that in order to accommodate "smart growth" initiatives that incorporate higher density developments, areas that did not fall within one of these protected areas would be identified for further consideration as receiving zones for transfer of development rights, or where increased development density could be considered. It should be noted that this evaluation does not provide a comprehensive mapping of all natural resource criteria that would necessarily be included in a siting study; it does, however identify areas of the County where development or wastewater management restrictions could be considered to be less critical from a water resource protection standpoint.

The goal of this task was to synthesize and document information that the County and other decision makers could utilize in policy making decisions regarding the protection of the County's water resources.

2.0 Approach

A map of areas that have been identified as critical for ground and surface water protection was developed, incorporating zones that have been mapped during previous studies.

The mapping was derived from a variety of sources, namely:

- Source Water Assessments (Task 5.5) modeling
- Modeling of the Contributing Areas to Suffolk County surface waters (Task 15)
- Deep Recharge Zones based on (Hydrogeologic Zones Designations)and
- Special Groundwater Protection Areas

The general procedure was to start with a “clean slate” and add each of these areas that warrant protections from the impacts of increased development densities.

Figure 1 illustrates the areal extent of the Task 16 mapping.

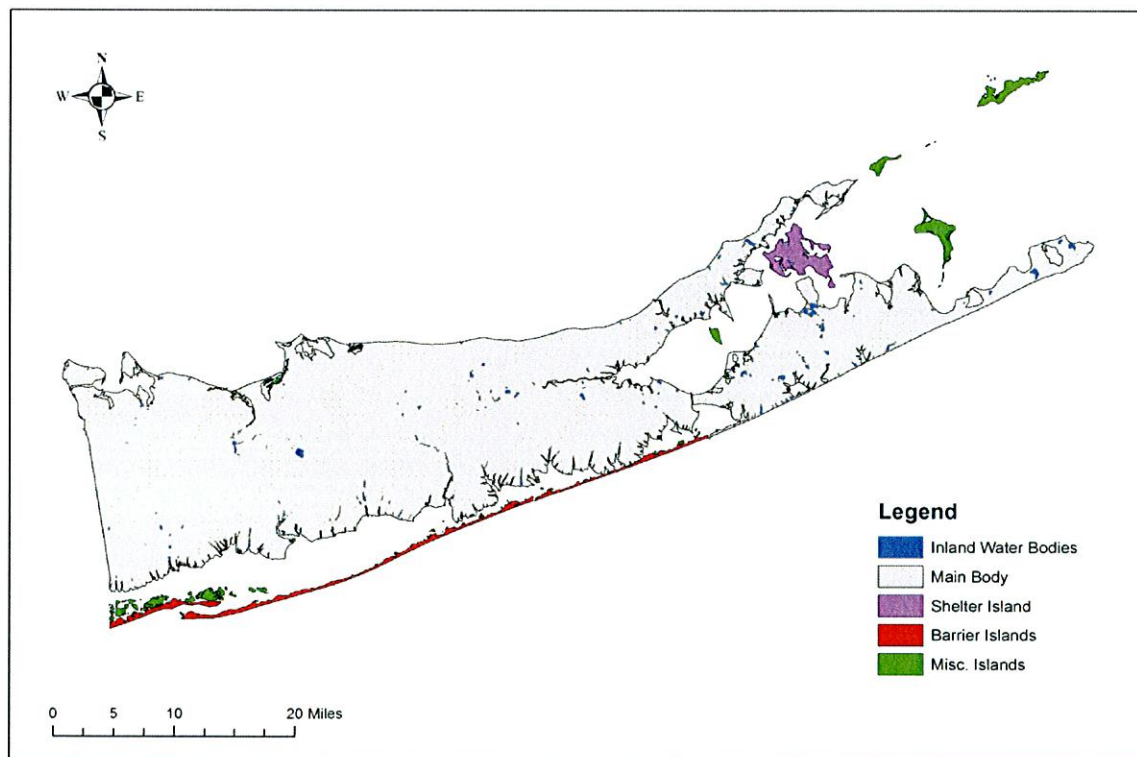


Figure 1 - Suffolk County Base Map Used for Exclusion Zone Development

Table 1 summarizes the area (square miles) associated with each component of the map.

Table 1
Surface Areas Associated with Suffolk County Base Map

Location	Area (Sq. mi)
Suffolk County Main Body (Including North and South Forks, Excluding Interior Water Bodies)	867
South Shore Barrier Islands	15
Shelter Island	12
Miscellaneous Islands	18
TOTAL	912

Since the miscellaneous islands were not part of the modeling efforts, they have been excluded from further consideration; therefore at the start of this analysis, the baseline area for the County was defined as 894 square miles (912 minus 18).

3.0 Exclusion Zone Mappings

3.1 Source Water Assessment Areas

The Task 5.5 Memorandum entitled **Refined Source Water Assessments** (CDM, 2009) documented the updated source water assessments developed in cooperation with the SCDHS and Suffolk County water purveyors. The areas contributing recharge to community water supply wells in the County were simulated using the Suffolk County Main Body flow model and the North Fork, South Fork and Shelter Island saltwater intrusion models that had previously been developed and calibrated.

The areas contributing recharge to community supply wells, or 'source water areas' were delineated using long-term average conditions of precipitation and recharge as described in the **Long Island Source Water Assessment Summary Report** (CDM, 2003) and long term average annual pumping rates, using an updated community public supply well database, including all active community supply wells as of autumn 2007, as well as planned future wells defined by the water suppliers. A total of 703 community supply wells pumping a total of 286 million gallons per day (MGD) was simulated. Pumping rates were assigned to the wells to represent long-term average conditions, with a minimum pumping rate of 5 gallons per minute (gpm) assigned to wells operated by small purveyors, as directed by SCDHS.

The source water areas used for this mapping include the land surface area contributing recharge to community supply wells within 100 years; a 100 foot buffer is incorporated into the

mappings to account for uncertainties associated with the modeling assumptions (e.g., constant recharge and water supply pumping rates). Additional detail on the contributing area mappings can be found in the **Refined Source Water Assessments** memorandum and the **Long Island Source Water Assessment Summary Report**.

The 100-year contributing areas to all Suffolk County community supply wells are shown on Figure 2. One hundred and thirty nine square miles of the County contribute recharge to public supply wells under the long term average conditions simulated. This represents 16 percent of the study area (139 out of 894 square miles).

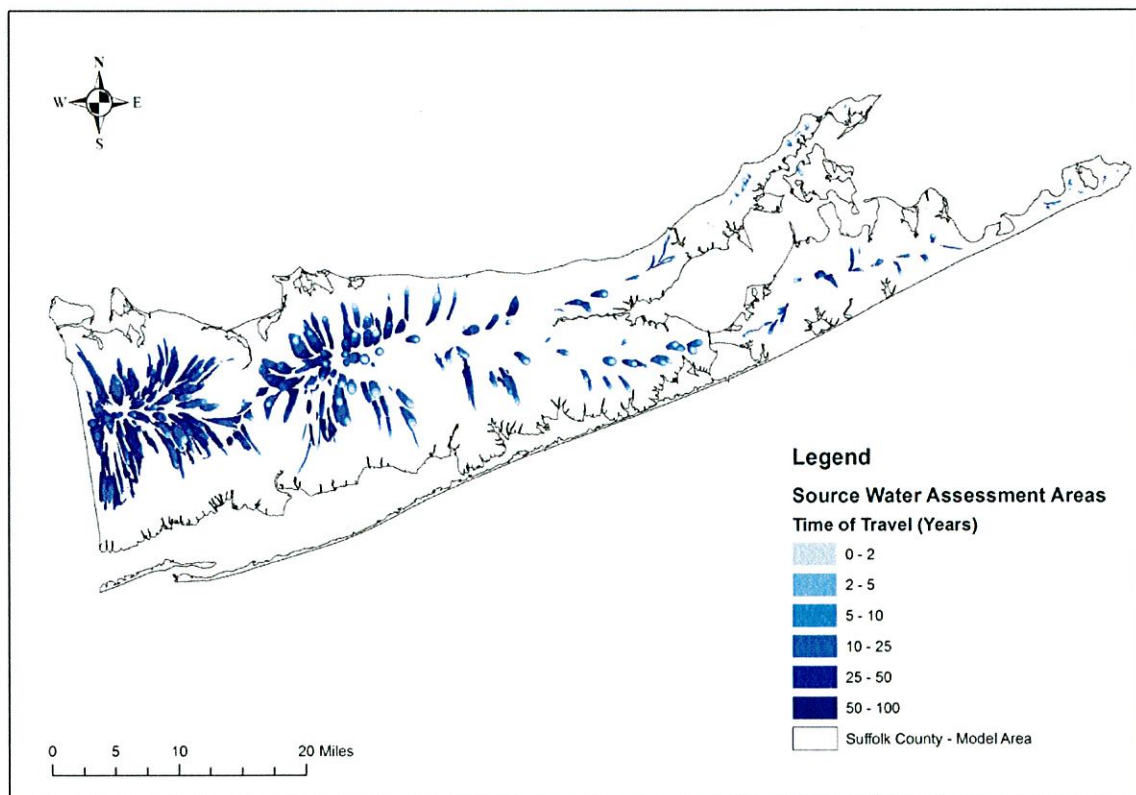


Figure 2 – Areas Contributing Recharge to Community Supply Wells in Suffolk County

3.2 Areas Contributing to Surface Water Features

Precipitation recharging the ground surface in Suffolk County is ultimately either removed from the underlying aquifer system by a well, or travels through the aquifer until it is discharged to a stream, embayment or other coastal surface water. The land surface areas where recharge is ultimately discharged to one of the County's surface water features have previously been mapped during several investigations. Most recently, County-wide mapping of the areas contributing to surface water baseflow discharges was completed and documented as the Task 15 memorandum entitled **Groundwater Contributing Area Assessment** (CDM, 2009).

The land surface area where recharging precipitation is simulated to discharge to a surface water feature within fifty years was used as the basis for Figure 3, below.



Figure 3 – Area Contributing Groundwater Baseflow to Streams and Coastal Waters

The area contributing to surface waters includes an additional 565 square mile area that warrants protection from the impacts of increased development densities. This area represents 63 percent of the study area (565 out of 894 square miles).

The breakdown of contributing area (sq. mi.) by timeframe is presented in Figure 4. Most of the area contributing baseflow to surface waters travels from the water table to surface water discharge within just two years (almost 42 percent). This indicates that the results of management actions implemented within this area should be observed quickly. In addition, the model indicates that nearly 89 percent of the area contributing baseflow to surface waters travels from the water table to surface water discharges within 25 years.

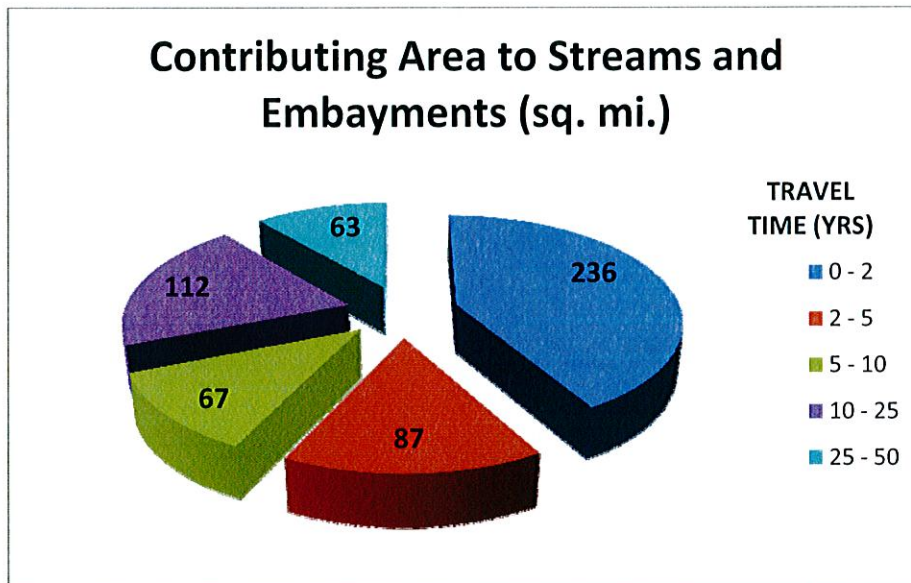


Figure 4 – Areas Contributing to Surface Waters within Specified Travel Time Intervals

Since the Source Water areas and the areas contribution to Streams and Coastal Waters are buffered (100 feet from the model results), the possibility of overlaps existed. To eliminate these overlaps, the data was cleaned by virtue of a spatial union and subsequent dissolve. This process resulted in the removal of eleven square miles of overlap from the surface water contributing area data (the source water areas were deemed most accurate, due to the more highly discretized sub-grids used for their development and hence they were not modified). Figure 5 illustrates, in red, where the overlaps occurred; Figure 6 depicts the combined contributing areas. After spatially joining the data from the Source Water Assessments and the Surface Water Contributing Areas and removing the overlaps, the resultant data encompassed

693 square miles which represents 78 percent of the study area (693 out of 894 square miles) eligible for exclusion.

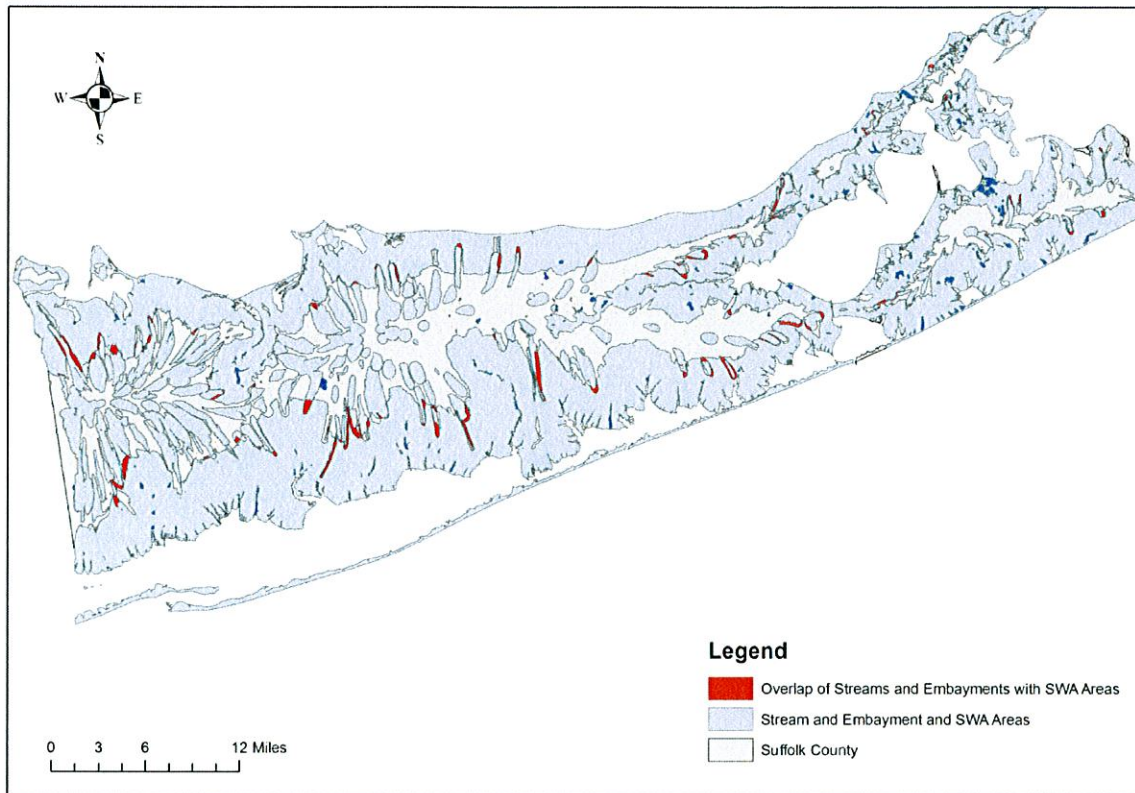


Figure 5 - Combined Areas Contributing to Public Supply Wells and Surface Waters

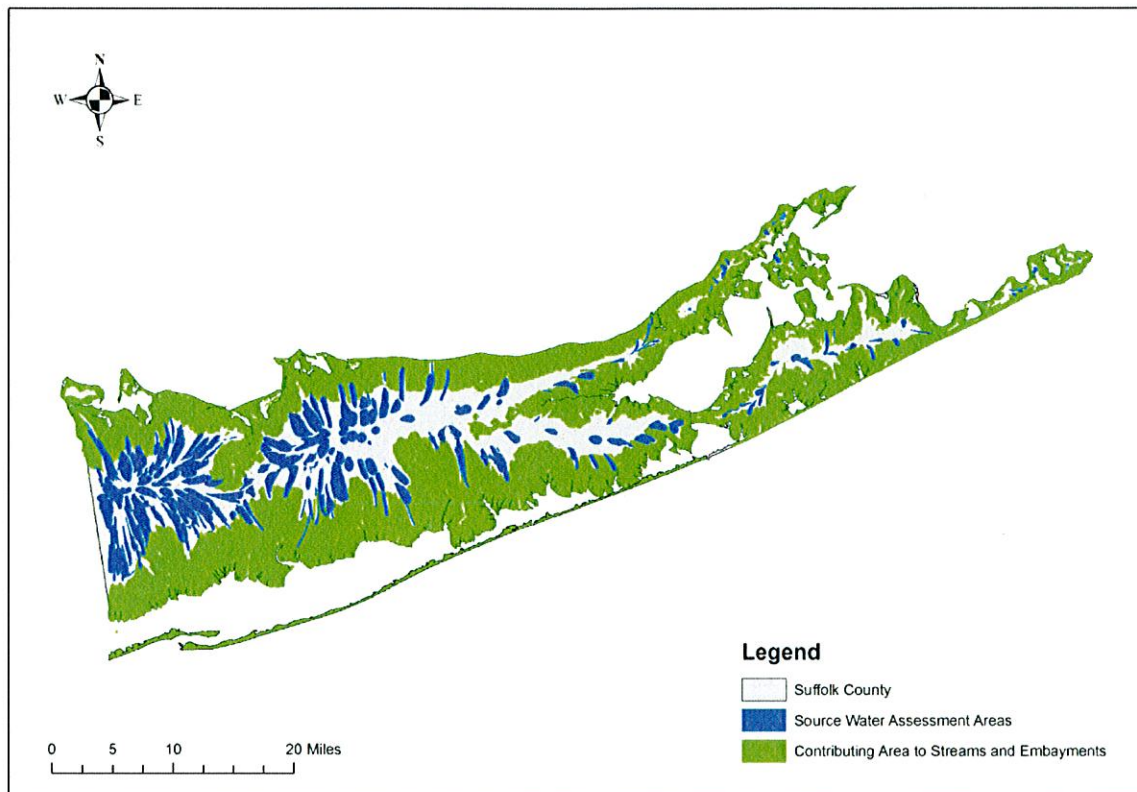


Figure 6 – Areas Contributing to Public Supply Wells and Surface Waters

3.3 Deep Recharge Hydrogeologic Zones

The 208 Study issued in 1978 by the Long Island Regional Planning Board (LIRPB) identified eight Hydrogeologic Zones in Nassau and Suffolk Counties with the objective of protecting groundwater quality. These eight zones were differentiated based on differences in underlying groundwater flow patterns and groundwater quality. The zones were subsequently revised by New York State Department of Environmental Conservation (NYSDEC) in the **Long Island Groundwater Management Plan**, and by Suffolk County. Zones I, II, III and V occupy geographic areas that are primarily characterized by a deep flow system (vertical component of groundwater flow recharging the aquifer) and are sometimes referred to as the “Deep Recharge Zone.” These areas are shown on Figure 7, and summarized in Table 2.

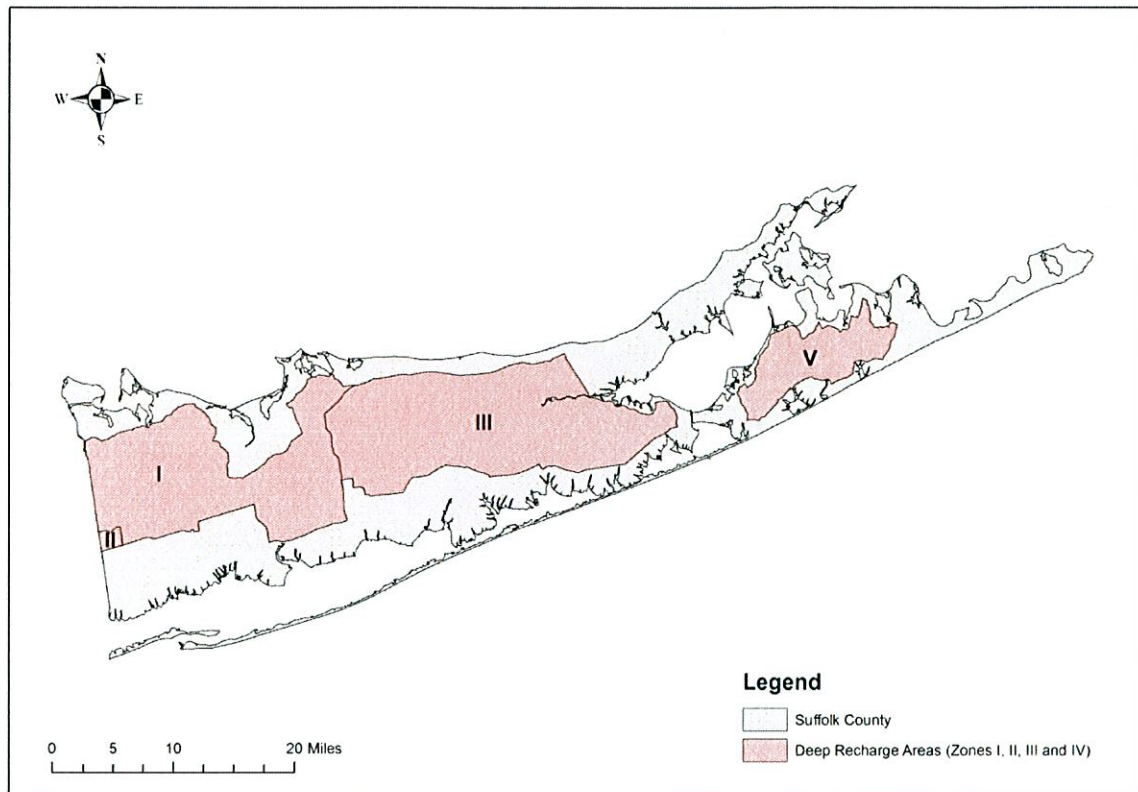


Figure 7 - Deep Recharge Zones

Table -2
Deep Recharge Zone Areas

Hydrogeologic Designation	Area (sq. mi.)
ZONE I	170
ZONE II	3
ZONE III	206
ZONE V	53
TOTAL	431

After spatially joining the data from the Source Water Assessments, the surface water contributing areas and the Deep Recharge Zones and removing the overlaps, the resultant data encompassed 860 square miles (which represents 96 percent of the study area, or 860 out of 894

square miles) of the County where management efforts should be focused for water resource protection. These areas are depicted on Figure 8.

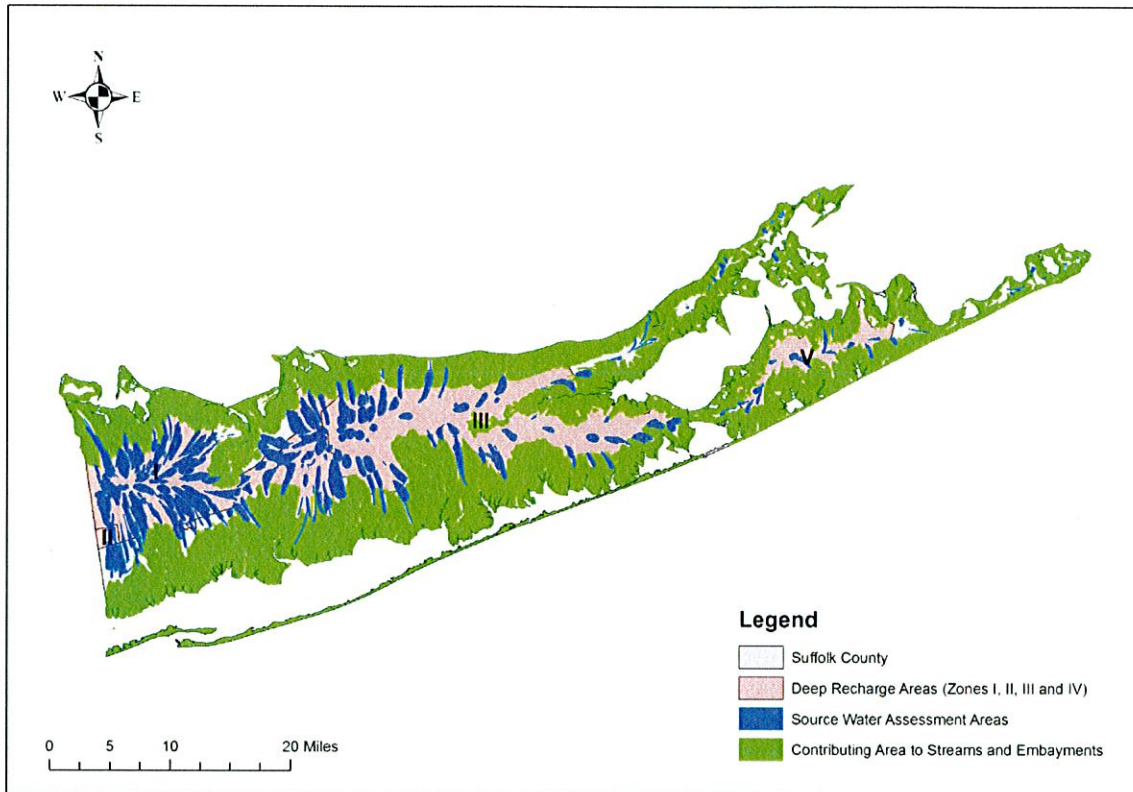


Figure 8 – Areas Contributing to Public Supply Wells, Surface Waters, and the Deep Recharge Zones

3.4 Special Groundwater Protection Areas

Article 55 of the New York State Conservation Law (Sole Source Aquifer Protection Act) designated areas on Long Island as Special Groundwater Protection Areas (SGPAs). The SGPAs are watershed recharge areas important for the maintenance of large volumes of high-quality groundwater and need to be protected. Special Groundwater Protection Areas (SGPAs) within Suffolk County encompass an area of 276 square miles. The seven SGPAs included in this study are shown in Figure 9.

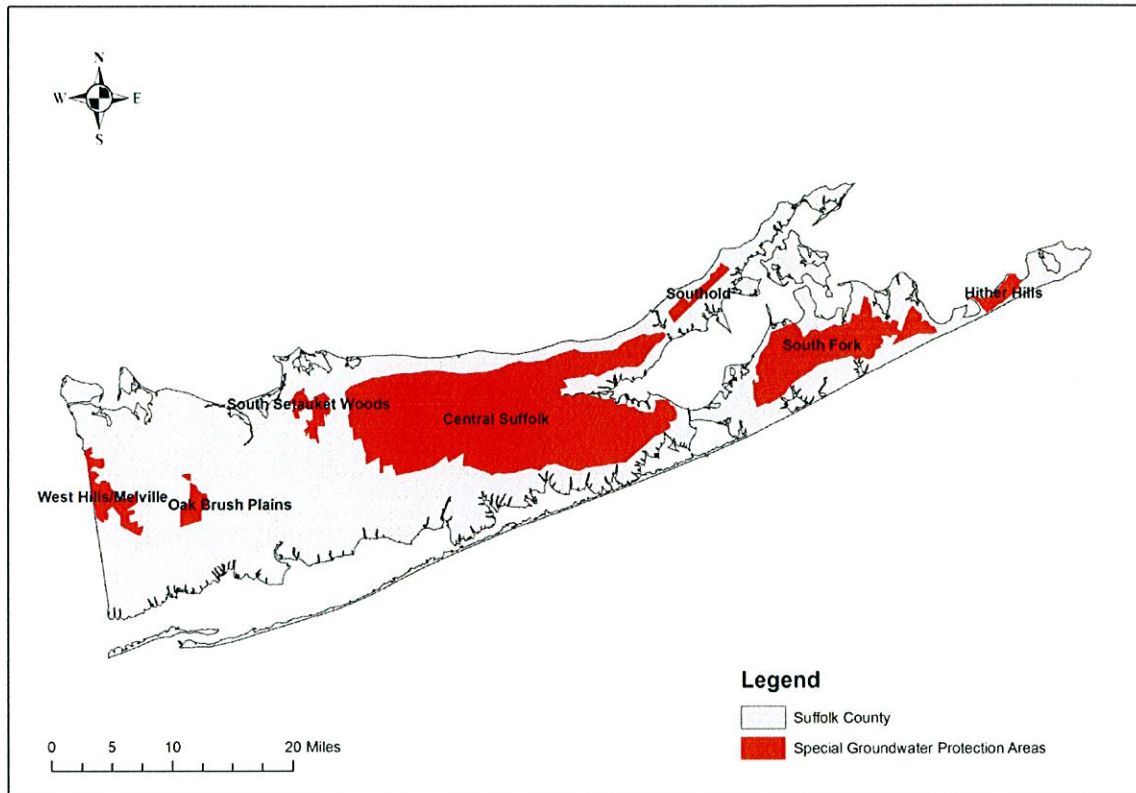


Figure 9 – Special Groundwater Protection Areas

Table 3 summarizes the seven SGPAs in the study area with their associated area.

Table 3
Special Groundwater Protection Areas in Suffolk County

Special Groundwater Protection Area	Area (Sq mile)
West Hills/Melville	11
Oak Brush Plains	5
South Setauket Woods	7
Central Suffolk	196
Southold	5
South Fork	47
Hither Hills	5
TOTAL	276

After spatially joining the data from the Source Water Assessments, the area contributing to surface waters, the Deep Recharge Zones and the Special Groundwater Protection Areas and removing the overlaps, the resultant data encompassed 871 square miles which represents 97 percent of the study area (871 out of 894 square miles). These areas are compiled on Figure 10.

The mapping indicates that virtually all of the County warrants protection based upon the selected criteria of drinking water, groundwater recharge and surface water protection. Potential management alternatives that may be considered by the County include: restrictions on siting increased unsewered density and sewage treatment plant discharges within the 50 year groundwater contributing areas of public water supply wells (assuming 50 years as a reasonable planning horizon); and, restriction of increased unsewered density and sewage treatment plant discharges sited within the 25 year groundwater contributing areas to surface waters (based upon the finding that almost 90 percent of the area contributing baseflow to surface waters travels from the water table to surface water discharges within 25 years). Other alternatives, either more or less protective of the County's water resources, may be considered by managers based upon their determination of the value of the management actions.

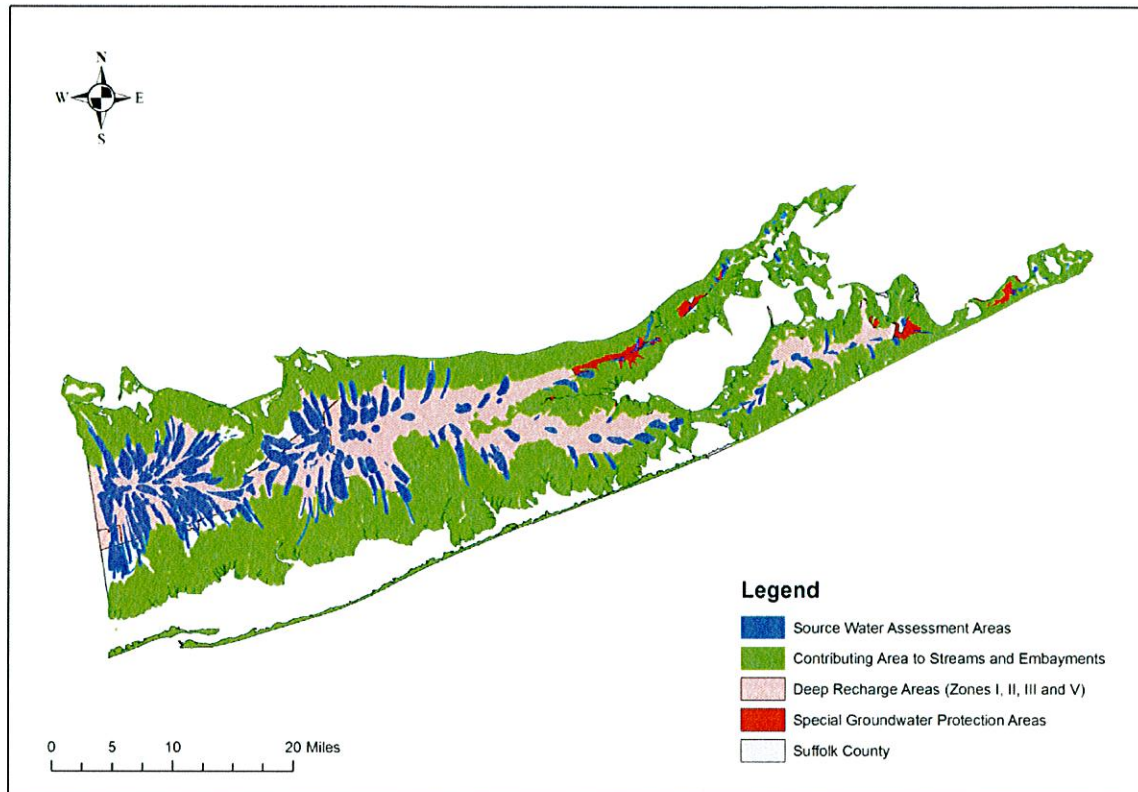


Figure 10 - Compilation of Areas to be Managed for Water Resource Protection

4.0 Exclusion Zone Mappings

The land surface area that is not included within any of the areas identified for protection from the impacts of increased development density is shown in Figure 11, below. The mapping indicates that only 3 percent of the County does not fall within the delineated areas deemed as most critical for water resource protection. It should be noted however, that inclusion on this map does not mean that all of the protections afforded by existing programs and regulations do not apply, as there are many other natural resource, planning, economic and social criteria that have not been incorporated into this evaluation. The mapping suggests only that future plans for redevelopment and work force/affordable housing could be considered for further evaluation in these areas.

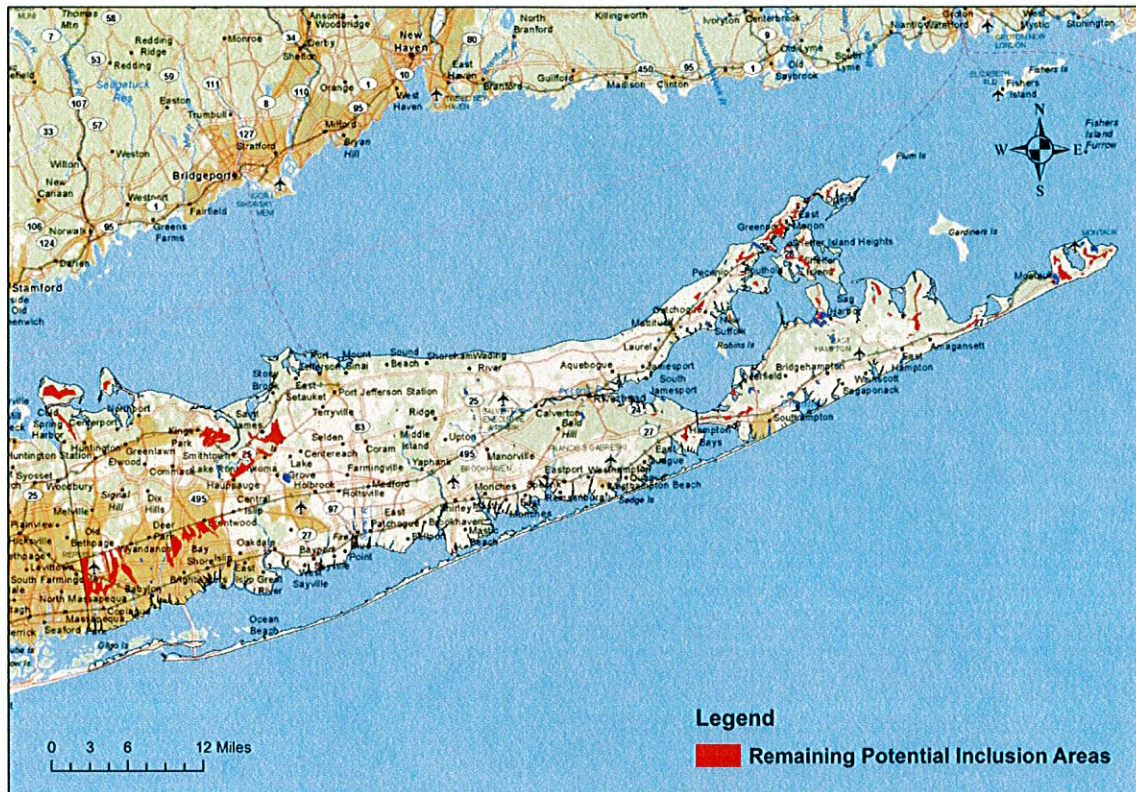


Figure 11 – Areas of Suffolk County Not Deemed Critical for Water Resource Protection using Existing Criteria

5.0 References

Camp Dresser & McKee. 1998. Task 9A Memorandum – Estimate of Nitrate Loading to the Peconic Estuary

Camp Dresser & McKee. 1999. Task 9B Memorandum – Groundwater Contributing Areas to North and South Shore Embayments

Camp Dresser & McKee. 1999. Task 9C Memorandum – Nitrogen Loadings to Harbors

Mr. Martin Trent
April 28, 2010
Page 15

Camp Dresser & McKee. 2001. **Suffolk County Flow Augmentation Needs Study Monitoring Report**

Camp Dresser & McKee. 2003. **Suffolk County Groundwater Model**

Camp Dresser & McKee. 2009. Suffolk County Comprehensive Water Resources Management Plan, Task 5.5 Memorandum - **Refined Source Water Assessments**

Camp Dresser & McKee. 2009. Suffolk County Comprehensive Water Resources Management Plan, Task 17 Memorandum - **Groundwater Contributing Areas**

Long Island Regional Planning Board. 1978. **Long Island Comprehensive Waste Treatment Management Plan (L.I. 208 Study)**

Long Island Regional Planning Board. 1992. **The Long Island Comprehensive Special Groundwater Protection Area Plan**

New York State Department of Environmental Conservation. 1986. **Long Island Groundwater Management Program**

New York State Department of Health (NYSDOH), 2003. **Long Island Source Water Assessment Summary Report**